

received recently from Miss Eunice Treuil, of Junior, Plaquemines Parish, Louisiana, who reports it as plentiful upon live oaks. Nine species of *Epidendrum* are reported from the southeastern United States but all the others are confined to Florida. The genus includes a large number of epiphytic species which are widely distributed in tropical regions. This one is not a showy plant, with its small greenish flowers.

In Mohr's Plant Life of Alabama* the range of *Epidendrum conopseum* is said to extend to Mississippi, but upon what information this statement is based is not apparent. The only specimen in the Mohr Herbarium is from Alabama. Doctor Mohr states that the species is not rare in the coastal plain of Alabama, growing on magnolias and live oaks in dense damp woods.

The original description was based upon plants collected in Florida by William Bartram. The accompanying illustration is from a photograph made at Washington of plants forwarded by Miss Treuil.

WASHINGTON, D. C.

CHARACTERS OF HELIANTHUS

BY T. D. A. COCKERELL

Although *Helianthus*, as typified by the common sunflower, is a very easily recognized genus, there are many species which it is not so easy to place. Mr. S. F. Blake† has very recently given a table in which *Helianthus* is distinguished from its nearest allies as follows:

Pappus caducous, of paleaceous awns and rarely short squamellae; herbs.

Helianthus L.

Pappus more persistent (caducous in some *Viguieras*, e. g., *V. mandoni* Sch. Bip.); awns often aristate; squamellae usually present; herbs or shrubs.

Squamellae none, or narrow and acute; achenes usually densely villous; alternate-leaved usually glutinous shrubs.

Flourensia D.C.

Squamellae present, mostly short, rounded, fimbriate; herbaceous or frutescent, very rarely resiniferous, often opposite-leaved.

Viguiera H.B.K.

* Contr. U. S. Nat. Herb. 6: 460.

† Proc. Amer. Acad., 49: 350. S. 1913.

L. H. Bailey's Standard Cyclopaedia of Horticulture, Vol. 1, 1914, separates *Viguiera* from *Helianthus* as follows:

Achenes pubescent.

Viguiera.

Achenes glabrous.

Helianthus.

Nuttall, as long ago as 1821, described *Helianthus petiolaris* (a strictly typical *Helianthus*) as having the "seeds small, and spotted, covered with a silky and fulvous down." Among the perennial Helianthi, some (e. g., *H. ciliaris* and *H. californicus*) have the achenes perfectly glabrous; others (e. g., *H. subrhomboideus*) have them hairy. In *H. tuberosus* the achenes of the ray florets are sparingly hairy on the corners. In *H. procumbens* (from Bolivia) they are sparsely but evidently hairy, the hairs rather long.

I have not yet had occasion to study *Flourensia*, which seems sufficiently distinct; but *Viguiera* is and has been a source of confusion. I am greatly indebted to Dr. N. L. Britton for material of *V. helianthoides* H.B.K., collected near Matanzas, Cuba, Aug. 28, 1903 (*Britton & Wilson*). Dr. Britton notes that it is the "type species of the genus, from not very far from the type locality." Its principal characters are as follows:

Viguiera helianthoides H.B.K.

Peduncles very slender, broadening under heads; the same broadening is seen in *Helianthus decapetalus* var. *plenus* (the "double" garden variety, with brilliant orange heads, four inches across). Leaves thin, broad-lanceolate, acuminate, tapering below to a slender petiole; essentially three-nerved, the main lateral nerves making very acute angles with the midrib; very sparingly short-hairy above, conspicuously hairy below; margins entire, except for occasional obscure irregular notches. The broadest part of the leaf is near the middle, not far below it as in *H. petiolaris*. The venation, with the lateral nerves coming off at very acute angles, resembles that of *H. fascicularis*. The nervures leaving the midrib come off at about 45°, instead of being (at least the lower ones) nearly transverse as in *H. grosseserratus*. Involucral bracts in two series only; broad at base, with narrower ends; the apical part of outer bracts, though much narrower than the basal, more or less broadened; margins of bracts loosely white-hairy. The inner bracts are formed practically as the outer bracts of *H. annuus*. There

may be three series of bracts, according to Millspaugh and Chase. Rays bright orange, with seven strong nerves; bifid at apex. (*H. californicus* has the rays bifid, and we have this year obtained a var. hort. *bifidus*, with the rays strongly bifid at apex, of the vinous type of *H. annuus*). Achenes black, mottled with gray; densely hairy, the hairs long and silvery. Corolla lobes of disc florets densely hairy. Disc bracts nearly parallel-sided, slightly narrowing toward the base (shape about as in *H. ciliaris*), without lateral lobes or teeth; ends ferruginous, sharply pointed, perhaps not folding over corollas in bud, in which case the character is a good one for separation from *Helianthus*. Pappus of disc florets of two very easily deciduous pointed scales, as in *Helianthus*; and two very persistent broad strongly fimbriate quadrate squamellae, entirely separate from the pointed scales. Rarely a squamella is bifid. Millspaugh and Chase* found that in Yucatan specimens (apparently representing a distinct sub-specific form) the squamellae were nearly always connate with the long pointed scales.

It is on this last character, of the squamellae, that *Viguiera* is separated from *Helianthus*. I find, however, that the condition of the pappus-scales in various species of *Helianthus* has not been exactly described. The following notes will illustrate the conditions found:

✓ *H. orgyalis* D.C. (In hort. D. M. Andrews, Boulder).

Disc florets with practically complete pappus crown, the lateral parts (squamellae) small, and attached to the others. Achenes of ray florets trigonal, with three pappus scales. The achenes are wholly smooth. Later, Dr. Britton sent me wild material collected in Miami Co., Kansas (*Oyster*), and it showed the same characters. On the characters of the pappus, this might be considered a *Viguiera*, but in other respects it is not allied to *V. helianthoides*.

✓ *H. maximiliani* Schrad. (In hort. D. M. Andrews, Boulder).

Disc florets with two pappus scales, which may have lateral basal tooth-like processes, rudiments of attached squamellae. Ray achenes trigonal, with three equally developed pappus scales. Achenes glabrous.

✓ *H. ciliaris* D.C. (Mesilla Valley, New Mexico, *E. O. Wootton*).

Disc florets with two short, pointed, rather broad pappus scales, their margins erose or toothed. Ray florets with two

* *Plantae Yucatanae*. Field Columbian Museum, Publ. 92 pp. 119-120. 1904.

pointed pappus scales, and two smaller ones. Achenes absolutely glabrous.

H. californicus D.C. (Ex hort. U. of California, Berkeley, *H. M. Hall*).

Disc florets with two long pointed pappus scales, no intermediate squamellae. Ray achenes trigonal, wholly without pappus scales, even in bud (ray florets without pistils). Achenes wholly glabrous.

H. procumbens Pers. (Bolivia, *O. Kuntze*; sent by Dr. Britton).

Disc florets with two long slender acuminate scales, and rudimentary and irregular intermediate squamellae; margins of pappus scales more or less erose or dentate. Achenes sparsely but evidently hairy, the hairs rather long.

H. pumilus Nutt. (Boulder, Colorado).

Disc florets with two long scales, very easily deciduous. Ray florets with four pappus scales, all large and practically equal, or two very small; the one on the outer side may have toothed margins. The ray florets have well developed pistils, but the long stigmatic branches are smooth. Achenes wholly glabrous.

H. aridus Rydb. (Boulder, Colorado).

The usual two scales on the disc florets, but most have also small accessory squamellae, often slightly attached to the long scales.

Thus the condition of the pappus-crown is very diverse, and it becomes extremely difficult to draw a hard line, on this character, between *Helianthus* and *Viguiera*. In the study of the pigments of *Helianthus*, I have recently discovered a remarkable character, which may be of value for taxonomy. The yellow or orange rays of many species, when immersed in liquor potassae (KHO), give a most brilliant scarlet color. The particulars are as follows:

H. pumilus rays turn orange vermilion, especially the basal half.

H. coloradensis rays turn bright scarlet.

H. fascicularis rays turn the same bright red; so also *H. utahensis*.

H. ciliaris rays give a good scarlet color.

H. procumbens rays turn entirely a very fine rich red.

H. subrhomboides rays turn brilliant scarlet along the veins.

H. maximiliani rays turn brilliant scarlet on basal half; apical half deep orange, red along the veins.

H. orgyalis rays turn brilliant scarlet on rather less than basal half, apical half more or less red along veins.

On the other hand, the rays of *H. decapetalus* var. *plenus*, *H. annuus*, *H. petiolaris*, *Viguiera helianthoides*, *Taraxacum*, *Solidago*, *Rudbeckia* (golden glow), *Chrysopsis*, *Tragopogon*, *Ratibida* and *Grindelia* do not turn red at all with KHO. Rays of *Heliosis scabra* turn deep orange, exactly the color of the orange flush on *Eschscholtzia* petals. *Helianthella quinquenervis* rays show no red. *Helianthus giganteus* (Highlands, N. C., Mrs. Wm. Duane) has the longitudinal veins reddened by the KHO, but there is no definite scarlet color; evidently there is a very minute quantity of the red-producing pigment.

A watery solution of reddened rays of *H. pumilus* is wine or cherry color; this color is completely discharged by nitric acid.

The red (anthocyanic) variety of *H. annuus* gives totally different reactions. The red parts of the rays turn green in KHO, and bright scarlet in acid. The green is due to the bluish or purplish (alkaline) state of the anthocyan pigment being modified by the presence of flavone, which is yellow with alkali.*

Thus lichens are not the only plants to be tested with chemicals in order to determine affinities. We find that most (not all) the perennial sunflowers, though apparently colored exactly like the others, really contain something very distinct. The type of *Viguiera*, so far as this character goes, falls with *H. annuus*, etc.

If the present rather unsatisfactory generic arrangement of the *Helianthus-Viguiera* series is changed, two courses are open. One is to merge all the species in a single genus, *Helianthus*; the other to restrict *Helianthus* to the annual species such as *H. annuus*, *lenticularis*, *cucumerifolius* and *argophyllus*, and refer the others to one or more distinct genera. On the latter basis, which seems preferable, *Viguiera* may be extended to

*I follow Miss Wheldale's interpretation of similar phenomena but H. H. Bartlett gives reasons for doubting her explanation. I found that on adding KHO to an acidulated extract of red sunflower rays a green color was produced, but the margins of the green area were clear blue-purple or lilac. This appears to support Miss Wheldale's theory.

cover part of what is now *Helianthus*, but it will not do to refer to that genus everything with squamellae, regardless of other characters. *Harpalium* Cass., 1818, which includes certain perennials, is older than *Viguiera* H.B.K., 1820. There are other names which may perhaps be rescued from the synonymy, but even if we grant the necessity for generic revision, it is as yet too early to say where the lines should be drawn and what names should be used. Mr. S. Alexander's root-characters for the perennials will certainly have to be taken into account. The new system should correspond to the actual relationships of the plants, and in order to establish it properly it will be necessary to consider the phylogeny of the whole group. For this purpose all characters are of interest, and all species, not excluding those of South America.

THE GALAX ODOR

BY E. F. ANDREWS

Only those who are familiar with the *Galax aphylla* in its native habitat are likely to have had their attention called to the peculiar odor characteristic of this pretty little plant. None of the handbooks with which I am acquainted make any mention of it, and the only allusion to it that I have met with in botanical writings describes it as "a polecat smell"—which may well suggest a doubt to the minds of the initiated whether the writer himself had ever smelt a polecat. There is nothing sharp or pungent about the galax, like the knock-down odor of the polecat, and the misnomer, "skunk cabbage," sometimes applied to it in the Georgia mountains, was no doubt suggested by the malodorous reputation of the true skunk cabbage (*Symplocarpus foetidus*) and intended to emphasize the abominableness of the smell rather than to describe its quality. In the galax, it is a faint, sickly carrion scent, too vague and elusive to attract attention except where the plant occurs in large masses, as it always does in its favorite home on the shady slopes of the Southern Appalachians. On Lavender Mountain, in Floyd County, Georgia, where these observations were made, the